

Date: Thursday, 26/06/2008 9:12:26 AM  
 User: Julie Lecocq

## Process Sheet

<b>Customer</b> : CU-DAR001 Dart Helicopters Services	<b>Drawing Name</b> : X-TUBE AS 350/355 HI FWD
<b>Job Number</b> : 40099	
<b>Estimate Number</b> : 13224	
<b>P.O. Number</b> :	<b>Part Number</b> : D350748141TRN
<b>This Issue</b> : 26/06/2008 <b>S.O. No.</b> :	<b>Drawing Number</b> : D350-748-141 REV D
<b>Prsht Rev.</b> : NC	<b>Project Number</b> : N/A
<b>First Issue</b> : / / <b>Type</b> : CROSSTUBES	<b>Drawing Revision</b> : D
<b>Previous Run</b> : 40108	<b>Material</b> :
<b>Written By</b> :	<b>Due Date</b> : 07/07/2008 <b>Qty:</b> 1 <b>Um:</b> Each
<b>Checked &amp; Approved By</b> : <u>JW 08.6.26</u>	
<b>Comment</b> : Est Rev:A New Issue 08-03-06 DD verified by:ec Est Rev B Removed polish 08.04.02 EC verified by : DD Est Rev C Remove LPS-3 08.06.23 EC verified by DD	

## Additional Product

Job Number:



<b>Seq. #:</b>	<b>Machine Or Operation:</b>	<b>Description :</b>
----------------	------------------------------	----------------------

1.0	D6017115	Crosstube Material
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**Comment:** Qty.: 1.0000 Each(s)/Unit Total : 1.0000 Each(s)  
 Crosstube Material  
 D6017-115  
 2.339" OD X 2.000" ID  
 Batch: B27471

a.m 08.07.21 ①

2.0	MORI SEIKI	MORI SEIKI CNC LATHE LARGE
-----	------------	----------------------------

**Comment:** MORI SEIKI CNC LATHE LARGE

1-Fill tube with sand &amp; install plugs on both ends as per Folio FA648

2-Turn first side as per Folio FA648

3- File transition lines smooth.

a.m 08.07.21 ①

3.0	QC1	INSPECT ALL DIM TO DIM SHEET
-----	-----	------------------------------

**Comment:** INSPECT ALL DIM TO DIM SHEET

a.m 08.07.21 ①

4.0	MORI SEIKI	MORI SEIKI CNC LATHE LARGE
-----	------------	----------------------------

**Comment:** MORI SEIKI CNC LATHE LARGE

1-Turn second side as per Folio FA648

2- File transition lines smooth.

a.m 08.07.21 ①

**Dart Aerospace Ltd**

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

Date: Thursday, 26/06/2008 9:12:26 AM  
User: Julie Lecocq

## Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: X-TUBE AS 350/355 HI FWD

Job Number: 40099

Part Number: D350748141TRN

Job Number:



Seq. #:

Machine Or Operation:

Description :

3-Scribe Part & Batch as per Dwg D350-748-141

*Q-m 08.07.21 @*

5.0

QC1

INSPECT ALL DIM TO DIM SHEET



Comment: INSPECT ALL DIM TO DIM SHEET

*Q-m 08.07.21 @*

6.0

QC8

SECOND CHECK



*AWM 8-7-21*



Comment: SECOND CHECK

7.0

OUTSIDE SERV.10

OUTSIDE SERVICES -skids



Comment: Sub-Contracting OUTSIDE SERVICES

Issue P/O: *7012*

Heat Treat to min 180 KSI As per Dwg D350-748-141

(MIL-T-6736 OR AMS 2759-1C)

Sand Blast tube after Heat Treat

Possible Supplier: Vac Aero

Ensure Certificate of Conformity is attached

*C208/08/25  
①*

8.0

PACKAGING 1

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

Receive & Inspect For Transit Damage

Ensure certificate of conformity is attached

*P 8/5/21 @*

9.0

QC6

DIMENSIONAL CHECK



Comment: DIMENSIONAL CHECK

*508/09/30 @*

10.0

HAND FINISHING1

HAND FINISHING RESOURCE #1



Comment: HAND FINISHING RESOURCE #1

Oil inside of tube with LPS-3.

A/R LPS-3 Batch: \_\_\_\_\_

*N/A E*

11.0

PACKAGING 1

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

Identify and stock in kanban rack

Location: *Back Hall*

*RT 08-09-30*

**Dart Aerospace Ltd**

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

Date: Thursday, 26/06/2008 9:12:26 AM  
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## Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: X-TUBE AS 350/355 HI FWD

Job Number: 40099

Part Number: D350748141TRN

Job Number:



Seq. #:

Machine Or Operation:

Description :

12.0

QC21

FINAL INSPECTION/W/O RELEASE



08/09/30 JJ

Comment: FINAL INSPECTION/W/O RELEASE

Job Completion



MF 08-09-30

**Dart Aerospace Ltd**

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

<b>DART AEROSPACE LTD</b>		<b>Work Order:</b> 40099
<b>Description:</b> Crosstube Assembly (AS350/355 High Fwd)		<b>Part Number:</b> D350-748-141
<b>Inspection Dwg:</b> D350-748-141 Rev: D		<b>Page 1 of 1</b>

### FIRST ARTICLE INSPECTION CHECKLIST

☒ First Article
 ☐ Prototype

Inspection Sheet	Drawing Dimension	Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments
SIDE A	2.240	+0.005/-0.000	2.245	/			
	2.180	+0.005/-0.000	2.185	/			
	2.180	+0.005/-0.000	2.195	/			
	2.237	+0.005/-0.000	2.242	/			
	2.272	+0.005/-0.000	2.277	/			
	2.306	+0.005/-0.000	2.311	/			
	2.339	+0.005/-0.000	2.343	/			
	2.339	+0.005/-0.000	2.343	/			
	0.062	+/-0.010	0.062	/			
	4.26	+/-0.030	4.260	/			
	R0.063	+/-0.010	R0.063	/			
	R0.50	+/-0.030	R0.500	/			
SIDE B	2.240	+0.005/-0.000	2.245	/			
	2.180	+0.005/-0.000	2.185	/			
	2.180	+0.005/-0.000	2.185	/			
	2.237	+0.005/-0.000	2.242	/			
	2.272	+0.005/-0.000	2.277	/			
	2.306	+0.005/-0.000	2.311	/			
	2.339	+0.005/-0.000	2.343	/			
	2.339	+0.005/-0.000	2.343	/			
	0.062	+/-0.010	0.062	/			
	4.26	+/-0.030	4.260	/			
	R0.063	+/-0.010	R0.063	/			
	R0.50	+/-0.030	R0.500	/			
	110.27	+/-0.060	110.310	/			

<b>Measured by:</b> a.m	<b>Audited by:</b> AWM	<b>Prototype Approval:</b>	N/A
<b>Date:</b> 08.07.21	<b>Date:</b> 8-7-21	<b>Date:</b>	N/A

Rev	Date	Change	Revised by	Approved
A	06.11.09	New Issue (P/O D350-748-101)	KJ/JLM	
B	07.10.24	Dwg Rev updated	KJ/EC/DD	

**DART**

RELEASED

06.10.31

DESIGN <i>QP</i>	DRAWN BY <i>QP</i>	<b>DART AEROSPACE LTD</b> HAWKESBURY, ONTARIO, CANADA	
CHECKED <i>HA</i>	APPROVED <i>HA</i>	DRAWING NO. D350-748-141	REV. D SHEET 1 OF 3
DATE 06.10.31		TITLE CROSSTUBE (AS 350/355 HI FWD)	SCALE NTS
A	06.03.31	NEW ISSUE	
B	06.06.30	ADD D6017-115 & PRIME AND PAINT	
C	06.08.14	ADD CAD PLATING	
D	06.10.31	MAG. PARTICLE AND CAD PLATE AS MFD.	

QTY	P/N	DESCRIPTION
X	D350-748-141	CROSSTUBE ASSEMBLY (AS 350/355 HI FWD)
1	D6017-115	CROSSTUBE (OR D6015-125)
2	D3502-1	SUPPORT
2	D2856-400-710	ABRASION STRIP
1	AELS-1032-225	INSERT
1	AN960JD10	WASHER
2	MS21920-20	CLAMP (PER DART SPEC. M-MS21920-20)
1	MS27039-1-10	SCREW

**D350-748-141 CROSSTUBE:**

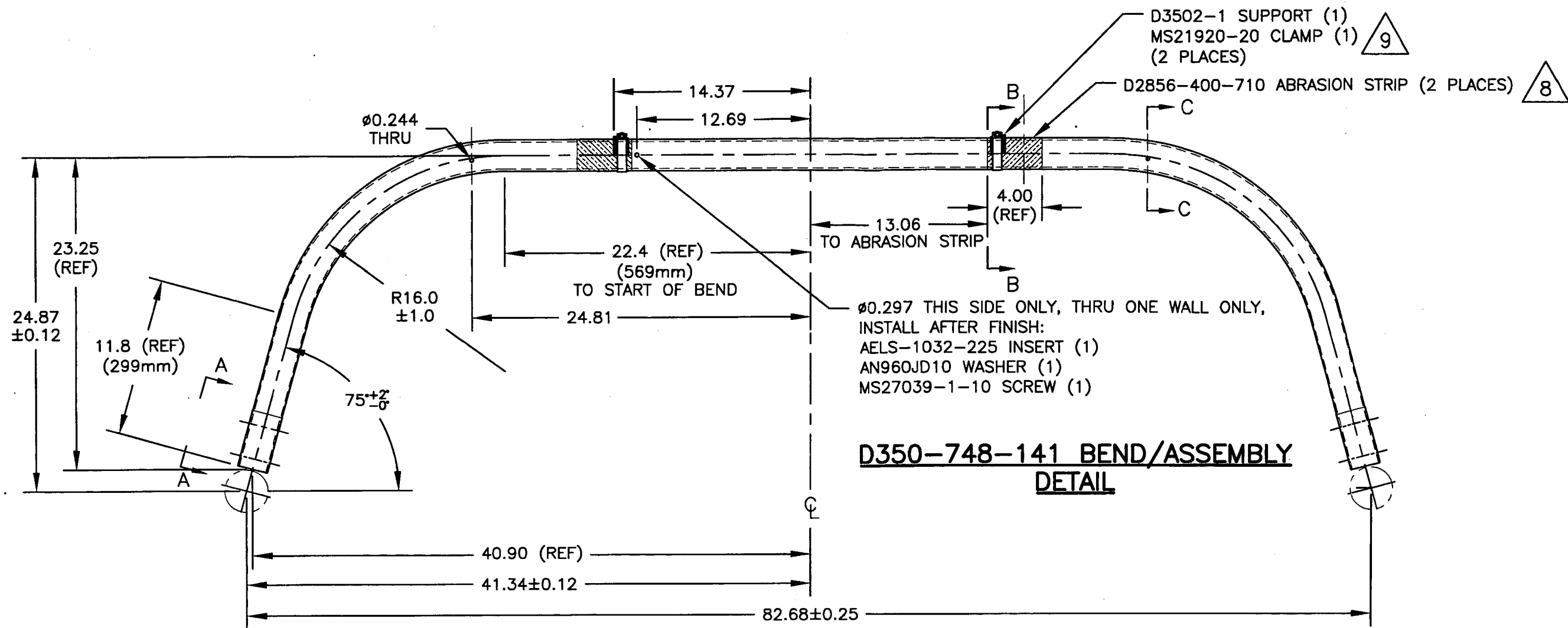
- 1) MATERIAL: MANUFACTURED FROM D6017-115 OR D6015-125  
FINISHED LENGTH =  $110.27 \pm 0.06$
- 2) MACHINE PER MACHINING DETAIL ON PAGE 3. BLEND OUT ALL EDGES FROM MACHINING LONGITUDINALLY, TRANSITIONS SHOULD BE SMOOTH. NOTE: ALL HOLES ARE DRILLED AFTER BENDING.
- 3) SCRIBE DART PART NUMBER AND BATCH NUMBER IN THIS AREA WITH VIBRATING STYLUS.
- 4) BEND PROGRESSIVELY WITH A MINIMUM OF 7 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
- 5) HEAT TREAT TO MIN. 180 KSI PER MIL-T-6736 OR AMS 2759-1C AFTER TURNING
- 6) FINISH: MAGNETIC PARTICLE INSPECT PER DART QSI 038 4.2  
CADMIUM PLATE PER AMS-QQ-P-416B, CLASS 1, TYPE II  
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2  
PAINT OUTSIDE PER DART QSI 005 4.2
- 7) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE. WHEN DRILLING HOLES EXTREME CARE MUST BE TAKEN AND CAREFUL DEBURRING PERFORMED TO ENSURE A CLEAN HOLE WITH NO CRACKING/CHIPPING/GROOVES.
- 8) INSTALL D2856-400-710 ABRASION STRIP WITH A GAP ON BOTTOM SIDE OF CROSSTUBE, CENTERED OPPOSITE D3502-1 SUPPORT, PER QSI 035.
- 9) TORQUE MS21920-20 CLAMPS 60 TO 80 IN-LB
- 10) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 11) ALL DIMENSIONS ARE IN INCHES
- 12) PART IS SYMMETRIC ABOUT CENTERLINE EXCEPT FOR  $\varnothing 0.297$  HOLE.

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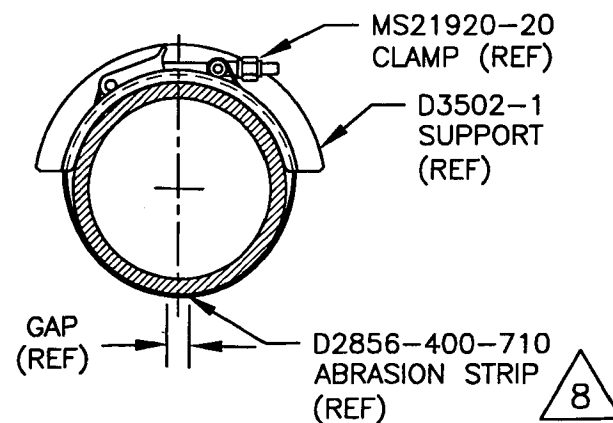
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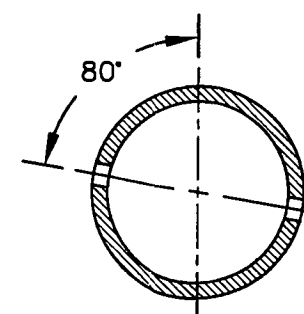




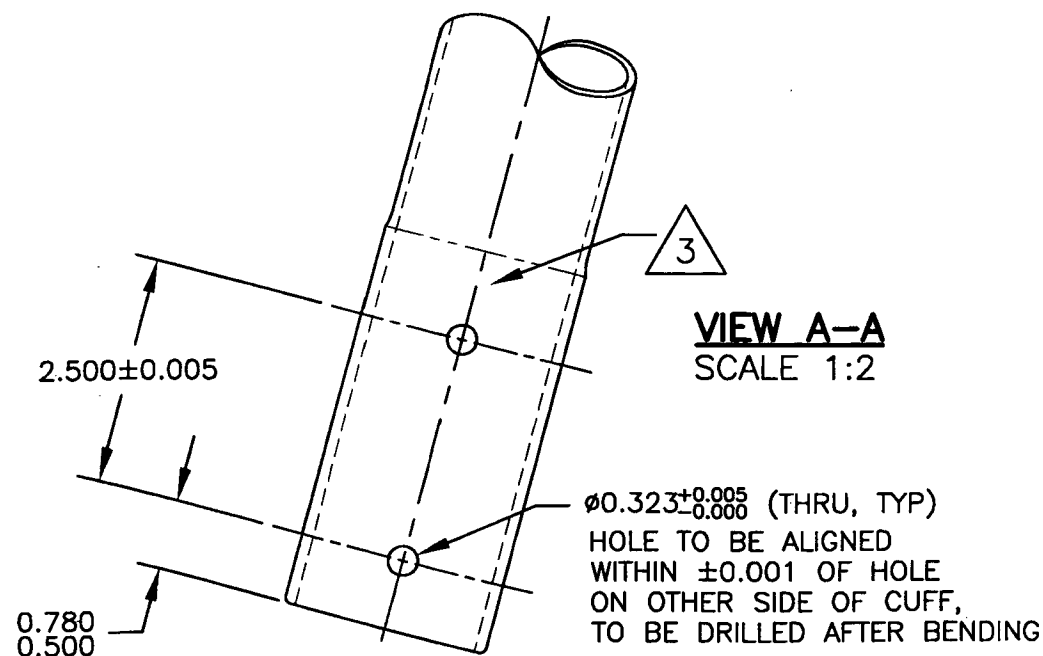
**SECTION B-B**  
SCALE 1:2



**SECTION C-C**  
SCALE 1:2



**VIEW A-A**  
SCALE 1:2



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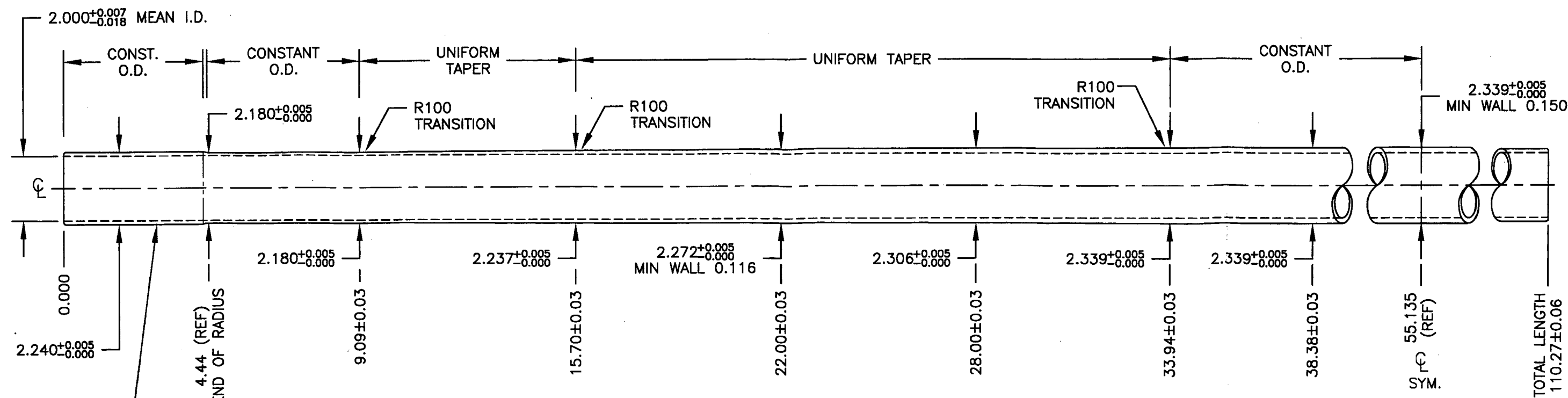
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07.02/16  
CUFF BEG. REDUCED  
06.07.22

**RELEASED**  
06.10.31

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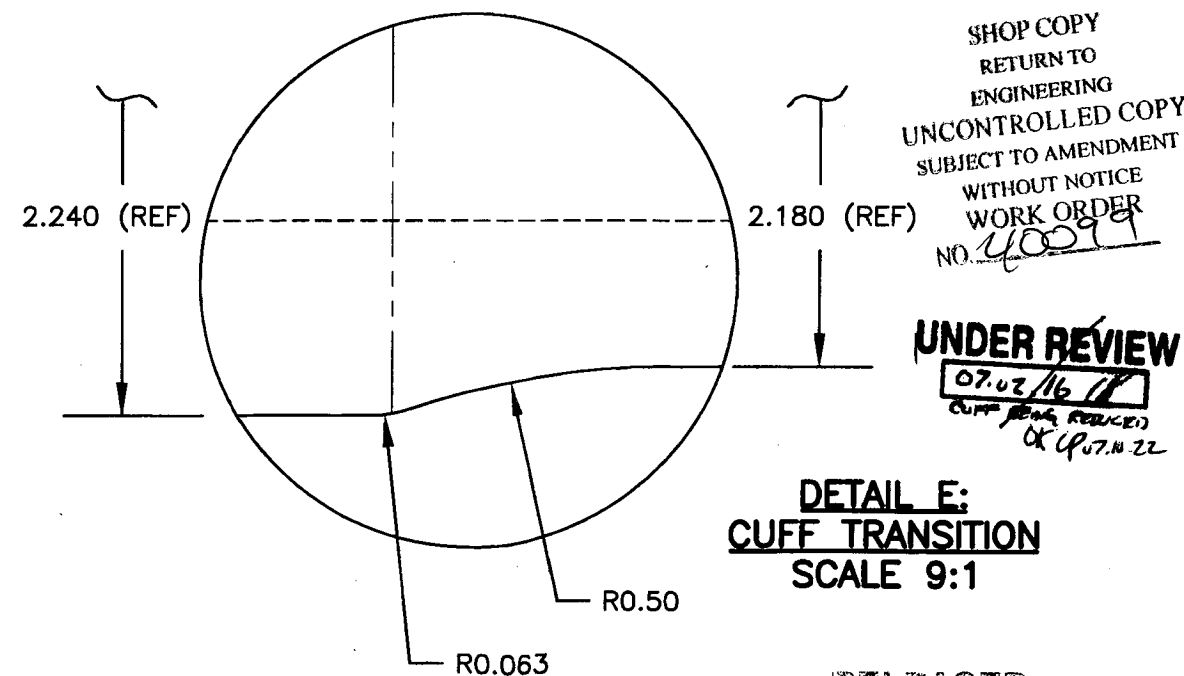
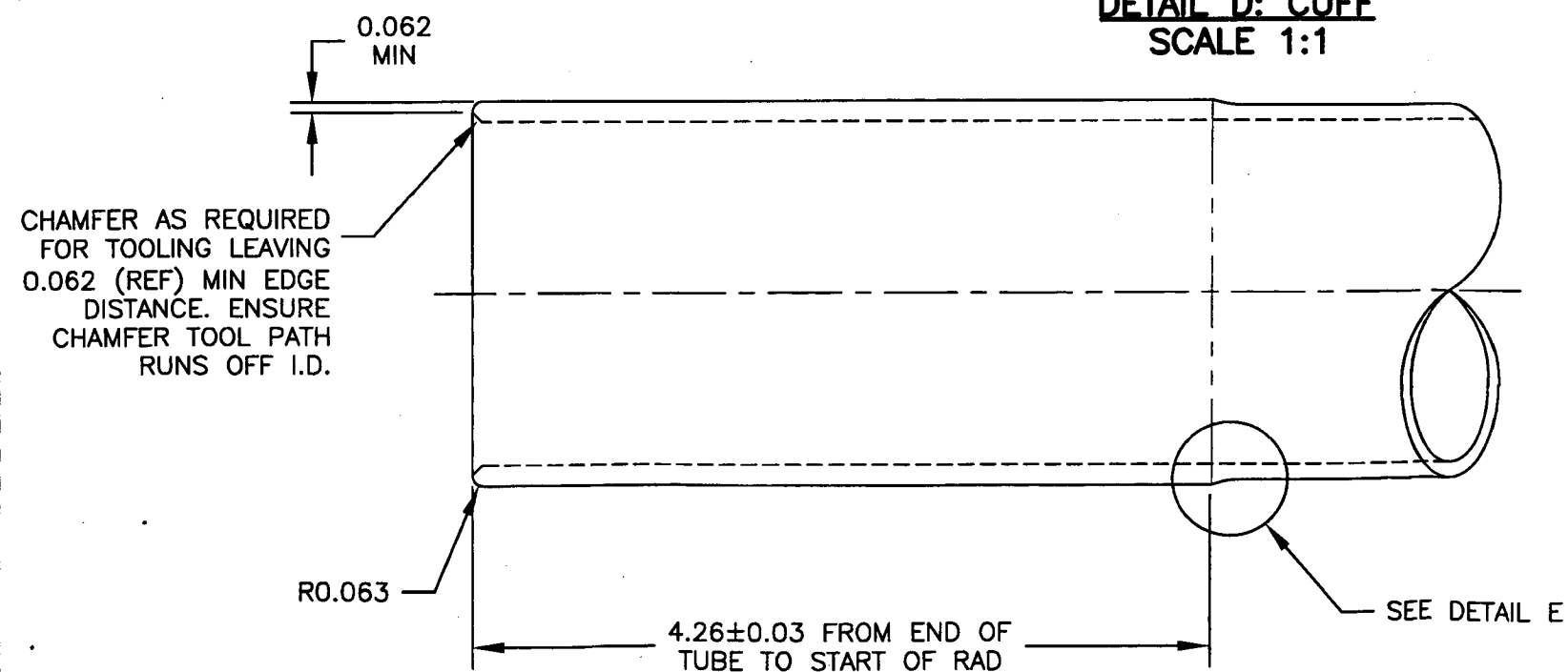
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DESIGN qp	DRAWN BY qp	<b>DART</b>	DART AEROSPACE LTD. HAWKESBURY, ONTARIO, CANADA
CHECKED H	APPROVED H	DRAWING NO. D350-748-141	REV. D SHEET 2 OF 3
DATE 06.10.31	TITLE CROSSTUBE (AS 350/355 HI FWD)	SCALE 1:8	



### D350-748-141 MACHINING DETAIL

#### DETAIL D: CUFF SCALE 1:1



#### DETAIL E: CUFF TRANSITION SCALE 9:1

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qp

DRAWN BY

qp

**DART**

DART AEROSPACE LTD.  
HAWKESBURY, ONTARIO, CANADA

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DRAWING NO.  
D350-748-141

REV. D

SHEET 3 OF 3

DATE

06.10.31

TITLE

CROSSTUBE (AS 350/355 HI FWD)

SCALE

1:3



**VAC AERO**  
INTERNATIONAL INC.

**RELEASE NOTE**

GST No. : R105468102

OAK 102442-1



HEAD OFFICE  
1371 SPEERS ROAD, OAKVILLE, ONTARIO  
CANADA L6L 2X5  
TEL: (905) 827-4171 FAX: (905) 827-7489



2009 WYECROFT ROAD, UNIT B  
OAKVILLE, ONTARIO  
CANADA L6L 6J4  
TEL: (905) 827-7377 FAX: (905) 827-1380



QUEBEC DIVISION  
7450 RUE VÉRITÉ STREET, ST. LAURENT, QUÉBEC  
CANADA H4S 1C5  
TEL: (514) 334-4240 FAX: (514) 334-6269

09/26/2008

MM / DD / YYYY

PAGE : 1

BILL TO: 1DAR01  
DART AEROSPACE LTD.  
1270 ABERDEEN ST.  
HAWKESBURY, ON

SHIP TO: DART AEROSPACE LTD.  
1270 ABERDEEN ST.  
HAWKESBURY, ON

K6A 1K7

K6A 1K7

DATE SHIPPED	SHIP VIA	F.O.B.
09/26/2008		ORIGIN
CUSTOMER P/O No.	JOB No.	TERMS
00007012		NET 30 DAYS

PART No.	DESCRIPTION	UOM	QTY ORD	QTY SHPD	TEST RESULTS
D350 748		EA	12	12	
<p>Process Specifications: Procedure: 4353 HEAT TREATED TO 180 KSI MIN. PER AMS 2759-1D 100% HARDNESS TESTED AS PER ASTM E-18, 40-45 HRC MATERIAL: 4130</p> <p>SAND BLASTED PARTS</p> <p>1 PIECE P/N D350-748-141 B4010 1 PIECE P/N D350-748-141 B4010 1 PIECE P/N D350-748-141 B4042 1 PIECE P/N D350-748-141 B4009 1 PIECE P/N D350-748-241 B4011 1 PIECE P/N D350-748-241 B4011 1 PIECE P/N D350-748-241 B4041 1 PIECE P/N D350-748-241 B4011 4 PIECES P/N D350-748-141 B0023</p>					

**100% HARDNESS TESTED**

12 PCS

42/43 HRC

S  
08/08/30



I hereby certify that the material covered by this release note has been inspected and tested and conforms to all specifications relevant thereto in accordance with the conditions of the contract / or purchase order.

ON BEHALF OF VAC AERO INTERNATIONAL INC.

*Anna Robinson*  
Authorized Q.C. Inspector



**VACUUM BRAZING - HEAT TREATING - SPECIAL PROCESSING - FURNACE EQUIPMENT  
TURBINE COMPONENT OVERHAUL - PLASMA AND OTHER COATINGS**



**HEAT  
TREATING**